mediate neighbourhood of Knock Drin. They are mainly critical or easily overlooked species as *Chara denudata*, Braun (new to the British Isles); he also discovered new localities for many very rare plants, as for *Neotinea intacta*, Reich, f.; for which see his paper in *Journ. Bot.*, 1892, p. 194. Among his Sikkim collections he found a small undescribed *Selaginella*, in which the macrospores are covered with hairs (perhaps only extensions of the tubercles frequently present) exceeding the breadth of the macrospore—an extraordinary morphologic example of the possibilities of unicellular development, and also of interest to the student of fossil botany, where similar, possibly Lycopodiaceous, spores occur.

Botanists, strangers to Mr. Levinge, who called at Knock Drin Castle, were received with domestic and scientific hospitality at once; they were instructed by the beautiful gardens; they were expedited to all the best collecting grounds in Westmeath and neighbouring counties, and the interesting plants put in their hands. His friends will unanimously agree that no more delightful man remains behind him. It is understood that he has bequeathed his collection to the Dublin Museum of Science and Art. C. B. C.

NOTES.

THE French Academy of Medicine has decided to divide between Dr. Roux and Prof. E. Behring the 250,000 francs prize, founded by M. and Mdme. Victor Saint Paul as a reward to whomsoever should first discover a remedy for diphtheria.

WE regret to have to record the death of the Moscow Professor of Zoology and Anthropology, Anatoly Petrovich Bogdanoff. He was born in Southern Russia in 1834, and after studying at the Moscow University, and writing, in 1858, his first dissertation on the colours of birds, he became Professor of the same University in the year 1863. In connection with this work he wrote an excellent text-book of zoology, and a still better work, unique in its kind, namely, a "Chrestomathy of Zoology," in three volumes, in which the reader obtains a thorough scientific acquaintance with the different classes of the animal kingdom by means of admirably chosen abstracts from the best authors, considerable attention being given to purely biological questions, and especially to the lowest animals, as well as to their manners of life. A couple of generations of Russian zoologists have been indebted to this admirable work. In the sixties, Prof. Bogdanoff founded, at Moscow, the well-known "Society of Lovers of Natural Sciences, Anthropology and Ethnography," whose numerous quarto volumes of *Memoirs* rank among the best scientific publications in Russia; and whose expeditions included the well-known Turkestan expedition of the late Fedchenko and Madame Olga Fedchenko. The chief anthropological work of A. P. Bogdanoff was on the inhabitants of the grave-mounds of the Moscow region. The full list of his nearly forty anthropological, and nearly thirty zoological works is given in the most valuable publication, "Materials for the History of Zoology, pure and applied, in Russia, chiefly for the last Thirty Years," of which he was the editor, and of which three volumes have already been published. His works for popularising biology, especially on Darwin's ideas, and for extending the interest in anthropology, are also numerous.

THE sixty-eighth meeting of German Naturalists and Physicians will be held this year at Frankfort-on-Main, from September 21 to 26.

OUR American correspondent writes, under date April 10: "Mrs. Elizabeth Mary Ludlow, mother of the late Robert Center, has given his estate, valued at 150,000 dols., to Columbia College as an endowment of 'The Robert Center Fund for Instruction in Music.' An anonymous friend has given 10,000 dols. to be expended in the purchase of books for the library. The Havemeyer family have given to Columbia College a fund as a memorial to Frederic Christian Havemeyer, with which the finest building in America for the study of chemistry will be erected, at a cost of nearly 500,000 dols. on the new site of the college. The building will be 80 × 208 ft., and four stories high. It will be finished in hard enamel, with floors of asphalt; and the corners of all rooms will be rounded so as to prevent accumulation of dust and disease germs, and the drainage system will permit every room to be washed out with a hose. Work is rapidly progressing on the other buildings, the library, the hall of physics, and Schermerborn Hall, which is devoted to natural sciences. Plans for the hall of engineering have been approved, and ground broken. The site of the chemistry building will be dedicated on May 2."

THE conditions of the 1100 guineas road carriage competition have now been settled by the proprietors of the *Engineer*, and are announced in the current number of our contemporary. An arrangement has been made with the Crystal Palace Company, who have offered facilities at the Crystal Palace for showing the carriages in work there, and for holding the subsidiary trials. The judges will be Sir Frederick Bramwell, F.R.S., Mr. J. A. F. Aspinall, and Dr. John Hopkinson, F.R.S. The competition is to be international. The vehicles will be divided into four classes and one supplemental class, in each of which a prize will be given, as follows:—(*a*) For the best mechanically propelled vehicle constructed to carry (including the driver) four or more persons, the total weight, when fully loaded, not exceeding two tons, a prize of 350 guineas; (*b*) for the best mechanically propelled vehicle constructed to carry either one or two or three persons, the total weight, when fully loaded, not exceeding one ton, a prize of 250 guineas; (*c*) for the best mechanically propelled vehicle constructed to carry, in addition to the driver, not more than one ton of goods or parcels, the total weight, when fully loaded, not exceeding two tons, a prize of 250 guineas; (*d*) for the best mechanically propelled vehicle constructed to carry, in addition to the driver, five hundredweight of goods or parcels, the weight, when fully loaded, not exceeding one ton, a prize of 150 guineas. (Supplemental).—For the vehicle, whether for passengers or goods, propelled solely by a motor actuated by the vapour of oil or spirit, having a lower specific gravity than 0·8, or a flashing-point lower than 73° F., Abel's test, and constructed to satisfy the requirements of any Act of Parliament, and the rules to be made thereunder for the time being respectively in force, which, in the opinion of the judges, best satisfies the purpose for which it is built, a prize of 100 guineas. Any method of propulsion other than muscular power may be employed, provided it be contained in the vehicle. Entries are to be made on printed forms (to be obtained at the offices of the *Engineer*) at any time prior to 6 p.m. on the last day of July, 1896. Preliminary runs will be made in the grounds of the Crystal Palace with each of the vehicles in succession. The practical working run will consist of a run on the public roads of not less than 100 miles out and 100 miles home, or a total of not less than 200 miles over a course to be announced three days prior to that fixed for the run. It will probably be arranged for Monday, October 12. Any vehicle which does not complete the "practical working run" at a *minimum* average speed of five miles an hour, to include all stoppages, to be disqualified.

In reference to the article on "The Tick Pest in the Tropics," contributed by Mr. C. A. Barber to these columns last June (vol. lii. p. 197), Dr. M. Francis, Veterinarian of the Texas Experiment Station, has drawn our attention to an account by him of the method of destroying ticks on the cattle of Texas, and, as the study of the tick pest is one of his principal duties, this description is of great value. After several unsuccessful attempts to destroy the pest by various means, the dipping process has been adopted at Texas with very gratifying results. A large vat of five thousand gallons capacity is used, and the cattle are forced to swim through it. Various carbolic and arsenical sheep-dips were employed as solutions in the vat, but the results were not satisfactory; either the cattle had to be kept in the dips for too long a time in order to kill all the ticks, or they were irritated by the solutions. This led Dr. Francis to try the effect of oil in destroying the ticks. It is well known that grease or oil, of almost any kind, is fatal to insects, lice, &c., and known facts as to the life-history and structure of ticks gave presumptive evidence that oil might be successfully substituted for the various commercial dips which had been employed. A layer, from three-quarters to one inch in thickness, of crude cotton-seed oil on the water in the vat was first used, the cattle being forced to swim through the vat, so that when they emerged they were covered perfectly with oil. This had no apparent effect on the cattle, but was found to be exceedingly fatal to the tick, and was very much superior to any other treatment tried. Dips of different nature were experimented with, but none as yet used have given such satisfactory results as the cotton-seed oil. Kerosene emulsion was found to have no practical value; crude petroleum irritates the skin, and emulsifies with water; resin oil is useless for the purpose; corrosive sublimate is too dangerous and is not very fatal to ticks even in solution 1 : 250 in water; and tobacco sheep-dips have no practical value. Dr. Francis is at present studying the effects of other oils, the most promising being West Virginia Black, a mineral oil. A full description of the construction of the vat and pen enclosure used will be found in the *Texas Farm and Ranch* of March 14.

CARNATION-LOVERS will read with much interest a *Bulletin* just issued from the Agricultural Experiment Station of Purdue University. It is entitled "Bacteriosis of Carnations," and describes in great detail an elaborate investigation which Messrs. Arthur and Bolley have carried out on a disease with which carnations are very frequently afflicted. That this disease is caused by true parasitic bacteria, these researches appear to prove beyond doubt, and Messrs. Arthur and Bolley have succeeded in isolating the specific microbe, which they have named "Bacterium Dianthi." Although this bacillus grows readily in artificial culture media when rendered acid, producing a yellow pigment, it has only been found in nature in leaves of the carnation-pink, and infection experiments seem to indicate that it is parasitic only upon pinks, and produces no effect on the shoots, leaves, or tubers of potatoes, or on other non-caryophyllaceous plants. The disease seems to be started by these bacteria entering the plant from the air through the stomata, or occasionally by means of punctures made by aphides; whilst their passage from one cell to another is due, in the opinion of the authors, to the secretion of an enzyme, by means of which the microbe "dissolves for itself a passage-way." Although no varieties of carnation are exempt from the disease, yet they differ greatly in their susceptibility towards it. Delicate varieties and poorly-grown plants are more readily affected than vigorous and well-grown varieties. It is satisfactory to learn that such a simple precaution as keeping the foliage dry, and preventing the presence of aphides, may practically banish this disease from our carnation-houses.

A CORRESPONDENT of the *Times* says:—"Within the last few weeks there has been in connection with the Dover Coalfield a transition from the experimental to the practical stage. In the last week of March the Kent Coal-fields Syndicate was formed, the capital of which was fixed at £200,000, and last week the whole of that capital was subscribed, a board of directors chosen, and a contract entered into for the sinking of two shafts as near as practicable to the Shakespeare's Cliff boring, it being stipulated that these two shafts are to be carried down to 2 ft.   in. seam (1138 ft.) within eighteen months, and equipped with the most approved machinery capable of winding 2500 tons per day."

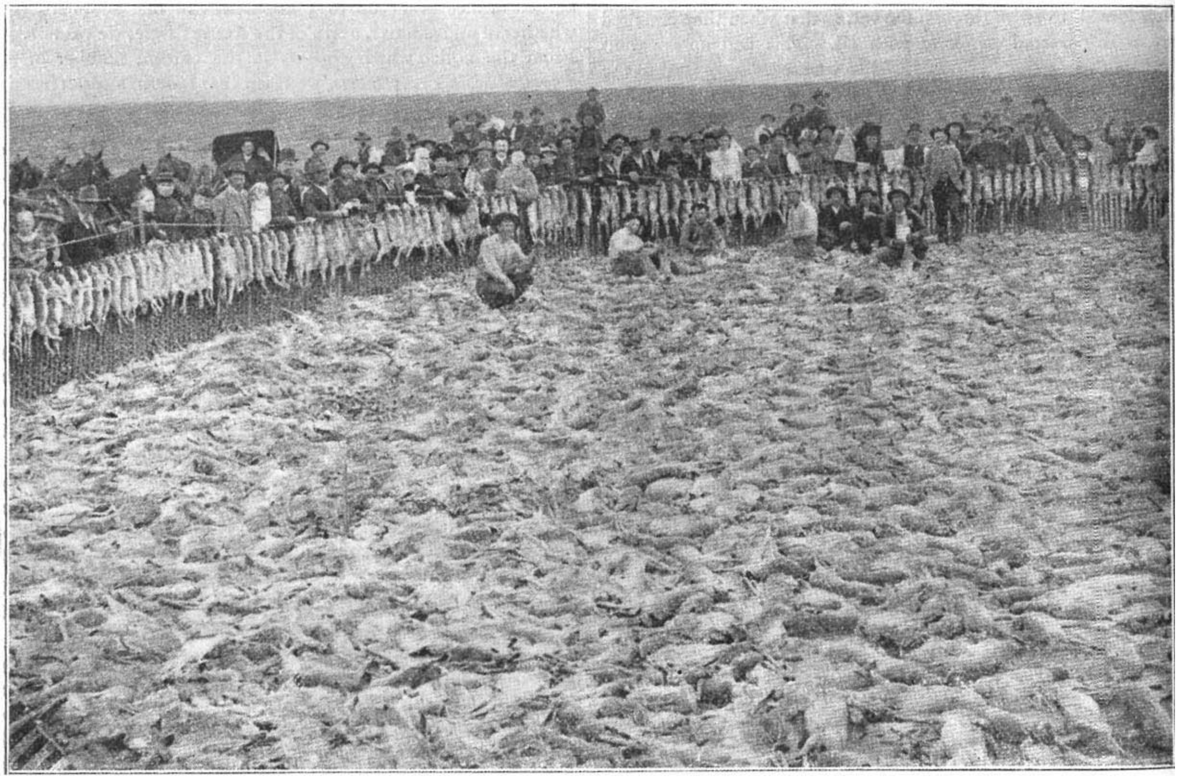
A "RECORD" has been accomplished in measuring geodetic base lines by the Swedish surveyor Jäderin. The French staff officers, using double bars of two metals and microscopes, consider 400 metres per day good work. Hatt, in Corsica, using an encased steel ribbon 20 metres long, stretched on stands by two weights of 8 kilogrammes, advanced 500 to 600 metres per day. But Jäderin, by employing successively two wires, one of steel and the other of bronze, stretched by spring dynamometers at a tension of 10 kilogrammes, and supported on ten tripods, succeeded in measuring up to 3 kilometres in one summer-day—whether at midsummer, north of the Arctic Circle, we cannot say. From the notice which appears in the current number of the *Physical Society's Abstracts*, we learn that Jäderin's paper has not been printed.

IN a valuable paper (*Atti e Memorie della R. Accad. di Scienze* in Padova, vol. xii., 1896, pp. 89-97), Prof. G. Vicentini has presented an interesting summary of his investigations on earthquake pulsations. The instrument employed is the microseismograph designed by himself (see NATURE, vol. li. p. 540), and now erected in the Universities of Siena and Padua. The motion of the paper on which the pulsations are recorded is unusually rapid, and this has allowed a detailed examination of their nature to be made. Prof. Vicentini distinguishes, as a rule, three phases in each disturbance. The first consists of rapid vibrations and small oscillations; the second of large, and more or less irregular oscillations, with several maxima which begin and end abruptly; in the third phase the pulsations become more regular, and are longer in period. Throughout nearly the whole movement, but especially during the last two phases, the mean position of the pendulum generally undergoes a continuous change, showing that with the more rapid oscillations there coexist long, slow waves with a period of at least twenty seconds, which result in a gentle tilting of the surface of the ground. If the earthquake is a severe one, and the origin at a great distance from the place of observation, the three phases are separated from one another. But, as the distance of the epicentre diminishes, the first two phases partly coalesce, and the rapid vibrations are superposed on the earlier long-period oscillations. When the earthquakes are weak and of local origin, the tilting of the ground is still observed. During the slight Rovigo earthquake of May 25, 1895, for instance, the tilting at Padua took place nearly in a straight line, slowly in the first ten seconds, but more rapidly in the next twelve, when it reached a maximum of about 6″. After this, for ten seconds, an equally rapid tilt took place in the opposite direction, and this was succeeded by several smaller oscillations, of about twenty seconds each, before the motion became imperceptible.

FROM the Horticultural Department of the Cornell University Agricultural Experiment Station we have a "Geological History of the Chautauqua Grape Belt," a narrow plain in the State of New York, extending north-eastward from the Pennsylvanian State line, bounded on the north by Lake Erie, and south by a high range of hills, well adapted for the culture of the vine.

THE Department of Entomology of the U.S. Department of Agriculture has issued an account of the San José Scale, its occurrences in the United States, and the remedies to be used against it, by Mr. L. O. Howard and Mr. C. L. Marlatt. As many as twenty-eight different kinds of trees and shrubs are enumerated as being liable to the attacks of this pest, including most of the common fruit trees, a few varieties of pear only being exempt.

THE "jack-rabbits" of Southern California and the adjoining States appear to be nearly as great a nuisance in America, as the ordinary rabbit in Australia and New Zealand. A lately published number of the *Bulletin* of the U.S. Department of Agriculture is devoted to a report, prepared by Dr. T. S. Palmer, on the jack-rabbits and their ravages, and on the best manner of getting rid of them, which is said to have become of late years a serious question in California, Colorado, Idaho, Oregon, and Utah. The so-called "jack-rabbits" belong to five species of the genus *Lepus*, which are spread over Western America from the plains of the Saskatchewan down to Mexico. They live on the open prairies, and, as they do not burrow, are compelled to trust for safety on their quickness of hearing and speed. Their ears and hind legs have been developed accordingly to an extraordinary degree. In some places they multiply to such an enormous extent that the damage done to the crops in one single county in California has been estimated at 600,000 dols., and one county in Idaho has expended more than 30,000 dols. in bounties paid for their destruction. The most effective mode of getting rid of jack-rabbits appears to be by driving them over a large tract of country into a "coral." On each side of the coral two long wings of wire-fencing are run out, and in some cases are extended to a length of six or seven miles on each side. The whole population of the country is then collected on a special day and a line formed, in order to drive the rabbits between the wings of fencing into the coral. In some cases these drives are carried out on a gigantic scale, and the number of rabbits destroyed on a single occasion runs up to 20,000. Upon the appointed day large numbers of people turn out, armed with sticks and clubs, and, scattering over a considerable area, start the rabbits and drive them towards the mouth of the coral. Every available vehicle is pressed into service, but the larger part of the throng is usually on foot. The lines gradually close in, and the frightened rabbits, urged on by blows and shouts, rush blindly into the opening between the wings, and are gradually despatched with clubs. The *Bulletin* contains a table, which shows that upwards of 370,000 "jack-rabbits" have recently been destroyed in this manner.



Result of the Grand Army Rabbit Drive at Fresno, California—20,000 Jack Rabbits killed.

THE last *Bulletin* received (vol. ii. No 6) of the Imperial University College of Agriculture (Tōkyō) contains important papers (in German), all relating to the culture of Conifers, by Prof. O. Loew and Dr. Seiroku Honda.

MESSRS. HENRY HOLT AND CO. announce, among their forthcoming works, "Electricity," by Prof. Charles A. Perkins, of the University of Tennessee, and "A Problem Book in Elementary Chemistry," by E. Dana Pierce, of the Hotchkiss School, Lakeville, Ct.

THE Field Columbian Museum has issued a Flora of West Virginia, by Mr. C. F. Millspaugh and Mr. L. W. Nuttall. Besides Flowering Plants the list includes the Vascular Cryptogams, Muscineæ, and Fungi; a considerable number of new species of Fungi being described. While commending the activity of this energetic Western station, we would venture to suggest, in future publications, a somewhat more careful revision of the press. Such names as *Equisitæ*, *Lycopodæ*, and *Impomœa* do not look well in a scientific publication.

WE have received the Summary Report of the Canadian Geological Survey, for 1895. Although strict economy has been rendered necessary, much good exploring work appears to have been done. The deep boring for oil at Athabasca Landing has now been continued down to over 1700 feet, with every prospect of early success when work is resumed this season. Students of Graptolites will welcome the announcement that Prof. Lapworth's work on the Canadian forms is now approaching completion.

In a communication made before the St. Petersburg Society of Naturalists (*Proceedings*, November 1895), Prof. Borodin described some interesting species of plants which he had discovered during his last summer's exploration of the lakes of the Valdai plateau, namely, the *Isoëtes echinospora* and the *Isoëtes lacustris*, the *Lycopodium inundatum*, *Botrychium virginianum*, and *Luzula angustifolia*, Garcke, var. *albida*, which last seems to have been imported, and now grows in masses along the embankment of the Moscow Railway. He especially mentioned the simultaneous occurrence, in Lake Bologoye, of the two species, *Caulinia fragilis*, W. (*Najas minor*, All.) and *Caulinia flexilis* (*Najas flexilis*, Rostk.), which, Prof. Borodin remarks, never occur together. The former is known from many localities of Southern and, partly, Middle Russia; but the second, which is altogether a rare northern species, has only been found until now in the lakes of Finland and Olonets.

The presidential address, delivered last December to the Geological Society of Washington, by Dr. G. K. Gilbert, has been published by the Society. It is entitled "The Origin of Hypotheses," and illustrates the methods of scientific investigation by reference to a particular problem—the origin of the peculiar crater-structure in limestone known as Coon Butte (Arizona). Involving as it does a consideration of all possible methods of the formation of a non-volcanic crater, it will be found to have a more special interest for geologists than the title might suggest.

The Rugby School Natural History Society is one of the best of the scientific societies attached to our public schools. The report for the year 1895 has just come to hand, and we recognise in it a spirit of devotion to science worthy of the fullest encouragement. It is no small matter for a school society to spend £270 upon the purchase of objects, cases for a new museum, and for the rearrangement of the specimens; yet that is what the boys at Rugby have done. A rigid economy of many years enabled the Society to meet the entire expenses of the removal and cleaning of the objects, without appealing for help from outside, but as a consequence its resources are entirely exhausted. Funds are needed to be devoted to new cases for the entomological collection in the museum, but, we understand from the report, unless material assistance beyond the ordinary income is received, it will be a long time before the Society's exchequer will be sufficiently replenished to warrant any expenditure. We cordially commend the position of the Society to philanthropists, believing that any assistance given would work for the increase of scientific investigators. The papers contained in the report are on the flight of birds, by Mr. W. T. Loveday; the contents of the Rugby School Museum, with suggestions for their improvement and enlargement, by Mr. W. E. Collings; the functions of a school natural history museum, by Mr. L. Cumming; and on earth-worms, by the Rev. Hilderic Friend. There are also the usual reports of the various scientific sections of the Society.

The additions to the Zoological Society's Gardens during the past week include a Red-faced Ouakari (*Brachyurus rubicundus*), from the Upper Amazons, presented by Mr. Ernest E. Austen; a Black-eared Marmoset (*Hapale penicillata*), a Common Marmoset (*Hapale jacchus*) from South-east Brazil, presented by Mr. R. H. Biddle; two Ring-tailed Coatis (*Nasua rufa*) from South America, presented respectively by Captain Hyde and Mr. James Green; a Lion (*Felis leo*, ♂) from Africa, deposited; an Indian Civet (*Viverricula malaccensis*) from India, a Nankeen Night Heron (*Nycticorax caledonicus*) from Australia, twenty Midwife Toads (*Alytes obstetricans*) European, purchased; a Weka Rail (*Ocydromus australis*) from New Zealand, received in exchange; two Maholi Galagos (*Galago maholi*), four North African Jackals (*Canis anthus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

Uranus and its Satellites.—As part of his work at Mount Hamilton during 1894 and 1895, Prof. Barnard took up the measurement of the positions of the four moons of the planet Uranus, and his results have just been published (*Astronomical Journal*, No. 370). Even with the 36-inch telescope the two inner satellites were usually difficult objects, while Titania and Oberon were also difficult if there was any wind to disturb the telescope. Ariel seems to be generally about half a magnitude brighter than Umbriel, and is the more easily visible notwithstanding that it is nearer to the planet. The compared brightnesses of Titania and Oberon seemed at first to show a variation of their relative light, amounting to a whole magnitude, but it is by no means certain that a real change occurs in the brightness of either; a consideration of the circumstances under which the comparisons were made has led Prof. Barnard to the curious conclusion that his eye has a tendency to make the lower of two equal lights appear the brighter, and he therefore thinks it probable that the two outer satellites are of constant and nearly equal brightness.

Apparently without being aware of the earlier observations of Schiaparelli and others, Prof. Barnard noticed a very decided ellipticity of the disc of Uranus, and found that the orbits of the satellites deviate some 20 or 30 degrees from the equatorial plane indicated by the major axis of the disc. For the polar and equatorial diameters, the measured values are 3″·93 and 4″·150 respectively, when reduced to the mean distance of Uranus from the sun equal 19·18329 astronomical units. The polar compression appears to be greater than that of Saturn, which fact indicates a rapid axial rotation. The mean diameter of the planet derived from the measures is 34,900 miles.

Comet Swift.—A telegram received from Kiel on April 17 announces the observation of Swift's comet at 8h., Echo Mountain mean time, on April 13 in R.A. 3h. 39m., Decl. 15° 40′ N. The comet is stated to have a tail, and was moving slowly westward. It is a little south of the Pleiades, so that it can only be observed for a short time after sunset.

A later telegram states that the comet was observed at the Lick Observatory at 8h. 26m. mean time on April 16; it was then in R.A. 3h. 38m., Decl. 18° 20′ N.

The Astronomical and Physical Society of Toronto.—Judging by the sixth annual report, which we have just received, this Society is doing good work in popularising the study of science in Canada. The volume contains reports of the semi-monthly meetings and a series of papers read before the Society. For the most part the papers give popular accounts of various astronomical and physical researches, among which "the spectra of nebulæ," "celestial photography," and "electrical radiation" may be specially mentioned. One of the communications, by A. Harvey, describing the behaviour of minerals at very high temperatures, is very suggestive. His experiments were made by means of a Barton electrical furnace, in which the current proceeds through water to the negative pole, so that an arc is formed where the mineral at the negative pole is brought to the surface of the water. The mineral in this way becomes surrounded by an intensely heated gaseous envelope, and its surface is quickly melted, while a brilliant light is produced. When removed from the water, the crust on the surface of the mineral greatly resembles that seen in meteorites. Different minerals give out light of different colours, and usually glowing particles are detached in very much the same way as those which give rise to the trails of shooting-stars. The volume also reports the proceedings of the Committee on the "unification of time." It appears that of the nine nations publishing ephemerides, six have formally given their assent to the proposal that on and after the first day of January 1901, the astronomical day should begin at mean midnight.